

## **REMARKS**

This is a full and timely response to the final Office Action mailed February 9, 2006. Upon entry of the amendments in this response, claims 1 – 2, 4 – 7, 9 – 11, and 16 – 26 are pending. In particular, Applicants have amended claims 1, 16 and 26, and have canceled claims 3 and 8 without prejudice, waiver, or disclaimer. Reconsideration and allowance of the application and presently pending claims are respectfully requested.

Any statements in the Office Action that are not explicitly addressed herein are not intended to be admitted. In addition, any and all findings of inherency are traversed as not having been shown to be necessarily present. Furthermore, any and all findings of well-known art and official notice, or statements interpreted similarly, should not be considered well known since the Office Action does not include specific factual findings predicated on sound technical and scientific reasoning to support such conclusions.

### **I.     Objections to Claims 3 and 8 are Moot**

The Office Action indicates that claims 3 and 8 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim.

Without acquiescing to the argument, Applicants have canceled claims 3 and 8 without prejudice, waiver, or disclaimer. Accordingly, Applicant submits that the objection is moot.

## II. Claims 1 – 11 and 19 - 26 Comply with 35 U.S.C. §112, First Paragraph

The Office Action rejects claims 1 – 11 and 19 - 26 under 35 U.S.C. §112, first paragraph, as allegedly failing to comply with the written description requirement.

Specifically, the Office Action alleges that “the amendment to independent Claim 1 and the limitation recited in new Claim 19, to require a *pulse waveform power source* adapted to *electrically bias the additional structure* to direct electrons from the plasma towards the substrate, as well as the recitations in new Claims 20 – 26 of further characteristics of the pulse waveform power source ... appear to lack support in the original disclosure.” (*Emphasis in original*, Office Action, pg. 3). “The only disclosure of a pulse waveform power source appears to be of such a power source connected to the mechanical support.” (Office Action, pg. 3).

Applicants respectfully submit that the specification provides full support for the amendments. Applicants agree with the Office Action that the disclosure provides support for the pulse waveform power source being connected to the mechanical support. Further, paragraph 60 of the specification recites that “additional structure 14 is one that is capable of being electrically biased in similar fashion to that of mechanical support 12.” Accordingly, the same biasing that occurs with respect to mechanical support 12 is disclosed as being capable of being applied to additional structure 14.

The Office Action also alleges that “there is no explanation in the original disclosure of pulse waveforms being supplied to *both* the mechanical support and the additional structure in such a way as to neutralize charge build-up on the substrate or to direct electrons with a particular energy to the substrate.” (*Emphasis added*, Office Action, pg. 3).

Although Applicants are unsure as to the precise claim language alleged to not be disclosed, Applicants direct attention to paragraphs 60 - 62, for example, which discloses a “third embodiment” which includes an additional structure 14. The “additional structure 14 is one that is capable of being electrically biased in similar fashion to that of mechanical support 12.” (Par. 60). Further “in this third preferred embodiment, electrically neutral reactive species 36 will form reactive beams or streams collinear with electrons 37” and “this combination of low energy electrons 37 and reactive species 36 arriving at the surface will accomplish LE4 of the substrate.” (Par. 61). Some of the electrons “will stick to the substrate surface, thereby transferring negative charge to it.” (Par. 62). Accordingly “sample 16 must be periodically ‘discharged’ or ‘neutralized’ by applying a periodic ac external bias to it on connection 18 using AC power source 19.” (Par. 62). As described in paragraph 59, “a modulated positive voltage is supplied on connection 18 to mechanical support 12.”

Thus, contrary to the allegation in the Office Action, **both** the additional structure and the mechanical support 12 are described as being able to “to neutralize charge build-up on the substrate or to direct electrons with a particular energy to the substrate.” Accordingly, Applicants submit that the rejection of claims 1 – 11 and 19 – 26 under §112, first paragraph should be withdrawn.

### III. Claims 1 – 11 and 23 – 25 are Patentable Over *Hayashi* in View of *Lee*

The Office Action indicates that claims 1 – 11 and 23 - 25 are rejected under 35 U.S. C. 103(a) as being allegedly unpatentable over U.S. Patent No. 4,950,376 to Hayashi (“*Hayashi*”) in view of U.S. Patent No. 5,279,669 to Lee (“*Lee*”).

#### *Independent Claim 1*

The Office Action again cites a number of references that relate to ion etching, here *Hayashi* and *Lee*, and alleges that “Applicant’s claim 1 does not require electron etching, but only that electrons are directed to the substrate.” (Office Action, pg. 12).

Accordingly, Applicants have amended claim 1 to more specifically set forth that the claimed apparatus is directed to etching using electrons. Specifically, claim 1 is directed to an “apparatus for low-damage anisotropic *electron dry etching*” and also includes a pulse waveform power source that electrically biases the additional structure, “the bias providing sufficient energy *for the electrons to etch material from the substrate.*”

The Office Action also alleges that “Applicant’s claims do not exclude etching by charged particles other than electrons.” (Office Action, pg. 12).

Applicants submit that it is irrelevant whether Applicants’ claim 1 excludes etching by charged particles other than electrons. Rather, the analysis is whether the references disclose, teach, or suggest each and every element of the Applicants’ claims, and Applicants submit that the proposed combination of *Hayashi* and *Lee* does not disclose at least the feature of “the bias providing sufficient energy for the electrons to etch material from the substrate” as recited in claim 1. Accordingly, claim 1 should be allowed for this reason alone.

The Office Action further alleges that, “regardless of whether Hayashi *et al.*, or even the combination of Hayashi *et al.* and Lee, expressly teaches that the electrons perform etching, the apparatus taught by the combination of Hayashi *et al.* and Lee would be structurally *capable of performing the intended use of electron etching.*” (Emphasis in original, Office Action, pg. 13).

Accordingly, the Office Action apparently disregards Applicants’ functional language, alleging that the structure of the references can be combined to meet the structure of Applicants’ claims. However, functional limitations in the claims cannot simply be ignored, but every limitation must be considered. See MPEP §2173.05(g). (“A functional limitation is an attempt to define something by what it does, rather than by what it is. Functional language does not, in and of itself, render a claim improper. A functional limitation must be evaluated and considered, just like any other limitation of the claim, for what it conveys to a person of ordinary skill in the pertinent art in the context in which it is used.”) See also *R.A.C.C. Industries v. Stun-Tech Inc.*, 49 USPQ2d 1793,1796-97 (Fed. Cir. 1998) (“adapted for concealment” interpreted as functional language requiring that an apparatus possess the capability of performing the recited function).

Applicants note that patent claims are allowed every day based on functional elements. The Office Action’s apparent disregard of Applicants’ functional language is tantamount to rejecting a computer implemented invention simply because any general purpose processor *could* be programmed to perform claimed functions. Here, even assuming Hayashi or Lee discloses a pulse waveform power source, such a pulse waveform power source can not be said to meet any possible functional limitation found

in Applicants' claims. Rather, it is just the opposite, as neither reference relates at all to electron etching.

Again, Applicants submit that the language appearing in the claims is not "an intended use" as alleged. Rather, these are functional limitations that must be considered in the analysis. In this respect, the Office Action must show the proposed combination of *Hayashi* and *Lee* discloses, teaches, or suggests "a pulse waveform power source adapted to electrically bias the additional structure *to direct the electrons from the plasma towards the substrate, the bias providing sufficient energy for the electrons to etch material from the substrate*" as recited in claim 1.

As an initial matter, *Hayashi* does not disclose a pulse waveform power source at all, and thus cannot meet the claimed element of "a pulse waveform power source adapted to electrically bias the additional structure to direct the electrons from the plasma towards the substrate, the bias providing sufficient energy for the electrons to etch material from the substrate" recited in claim 1.

Further, even assuming, *arguendo*, that *Lee* discloses a pulse waveform power source as alleged, *Lee* uses electron cyclotron resonance (ECR) "thereby keeping electrons confined within plasma 16." (col. 9, line 16). Accordingly, looking to col. 6, line 50 – col. 7, line 25, as cited in the Office Action, the biased voltage on extraction grid 60 does not provide "sufficient energy for electrons to etch material from the substrate." In fact, there is no mention at all of directing electrons toward the substrate. Rather, the electrons are "confined within plasma 16" (col. 9, line 16) because of the ECR.

Accordingly, Applicants submit that *Lee* cannot “bias the additional structure to direct the electrons from the plasma towards the substrate, the bias providing sufficient energy for the electrons to etch material from the substrate” as recited in claim 1. Thus, independent claim 1 should be allowed for this reason alone.

Further, the Office Action alleges that “the apparatus taught by the combination of Hayashi *et al.* and Lee is structurally the same as the claimed apparatus, and would be inherently be [sic] capable of low-damage anisotropic dry etching.” (Office Action, pgs. 5 – 6). Accordingly, the Office Action alleges that “this rejection is based on the fact the apparatus structure taught above has the inherent capability of being used in the manner intended by the Applicant.” (Office Action, pg. 6).

Applicants respectfully traverse the finding of inherency. Specifically, Applicants submit that the Office Action has not provided a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art. In fact, Applicants submit that the Office Action is apparently using an inherency argument as a license to completely disregard the functional limitations in Applicants’ claims.

As recited in MPEP 2112 §IV, the fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993)

In fact, the law surrounding the doctrine of inherency has not changed for over 60 years. In fact, the Federal Circuit has repeatedly quoted the language from the 1939 decision *Hansgirk v. Kemmer*, 26 C.C.P.A. 937, 102 F.2d 212, 214, 40 U.S.P.Q. (BNA)

665, 667 (CCPA 1939)), which stated “Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing *may* result from a given set of circumstances is not sufficient.”

This is clearly a situation where, at best, such a teaching that may be consistent with the other teachings of the cited references, but is certainly not necessarily present. Such situations are specifically addressed in the M.P.E.P. and Federal Circuit precedent, and do not constitute proper teachings for supporting a rejection of the claimed subject matter, under the doctrine of inherency.

In contrast to these legal and procedural requirements, the Office Action has substituted independent judgment in place of the actual teachings of the cited references, in a manner that embodies clear (and improper) hindsight. Neither *Hayashi*, nor *Lee*, discloses electron etching. Therefore, Applicants traverse the finding of inherency as to a pulse wave form power source “adapted to electrically bias the additional structure to direct the electrons from the plasma towards the substrate, the bias providing sufficient energy for the electrons to etch material from the substrate” as recited in claim 1.

Accordingly, Applicants respectfully submit that independent claim 1 is allowable over the proposed combination of *Hayashi* and *Lee* for at least these reasons. Furthermore, dependent claims 1 – 2, 4 – 7, 9 – 11, and 23 – 25 are allowable for at least the reason that they depend from allowable independent claim 1.



***Dependent Claims 2, 4 – 7, 9 – 11 and 23 - 25***

Applicants submit that dependent claims 2, 4 – 7, 9 – 11 and 23 - 25 are allowable as a matter of law for at least the reason that claims 2, 4 – 7, 9 – 11 and 23 - 25 contain all the features and elements of independent claim 1, which Applicants believe to be allowable. For at least this reason, Applicants request that the rejection of claims 2, 4 – 7, 9 – 11 and 23 - 25 be withdrawn.

Furthermore, with respect to claims 23 – 25, the Office Action alleges that the “pulse waveform would inherently be capable of directing enough ions of one charge towards the substrate to neutralize an existing charge on the substrate, without damaging the substrate.” (Office Action, pg. 6).

Applicants respectfully traverse the finding of inherency. Specifically, Applicants submit that the Office Action has not provided a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art. In fact, Applicants submit that the Office Action is apparently using an inherency argument as a license to completely disregard the functional limitations in Applicants’ claims.

As recited in MPEP 2112 §IV, the fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993).

#### IV. Claims 16 - 18 are Patentable Over *Hayashi* in View of *Kofuji*

The Office Action indicates that claims 16 – 18 are rejected under 35 U.S. C. 103(a) as being allegedly unpatentable over *Hayashi* in view of U.S. Patent No. 6,231,777 of Kofuji (“*Kofuji*”).

##### ***Independent Claim 16***

Applicants submit that independent claim 16 is patentable over the proposed combination of *Hayashi* and *Kofuji* for at least the reason that neither *Hayashi* nor *Kofuji*, separately or in combination discloses “charged particle controller means, disposed proximal to the substrate holder, for controlling the flux of charged particles directed from the plasma onto a substrate disposed on the substrate holder, *the flux having sufficient energy for the electrons to etch material from the substrate*” as recited in claim 16.

In rejecting claim 16, the Office Action alleges that “*Kofuji et al.* expressly teaches that electrons are drawn to the substrate during the positive swing of the pulsed electrical bias” (Office Action, pg. 9) and that it “is the Examiner’s assertion that these electrons would inherently be capable of etching the substrate, since the apparatus taught by the combination of *Hayashi et al.* and *Kofuji et al.* is structurally the same as that claimed by [sic] Applicant.” (Office Action, pg. 9).

Applicants respectfully traverse the finding of inherency. Specifically, Applicants submit that the Office Action has not provided a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art. In fact, Applicants submit

that the Office Action is apparently using an inherency argument as a license to completely disregard the functional limitations in Applicants' claims.

As an initial matter, *Hayashi* does not disclose an apparatus for electron etching at all, and thus cannot meet the claimed element of "charged particle controller means, disposed proximal to the substrate holder, for controlling the flux of charged particles directed from the plasma onto a substrate disposed on the substrate holder, the flux having sufficient energy for the electrons to etch material from the substrate" recited in claim 16.

Further, even assuming, *arguendo*, that *Kofuji* discloses that "electrons are drawn to the substrate during the positive swing of the pulsed electrical bias" *Kofuji* does not disclose "controlling the flux of charged particles directed from the plasma onto a substrate disposed on the substrate holder, the flux having sufficient energy for the electrons to etch material from the substrate" recited in claim 16.

Accordingly, Applicants respectfully submit that independent claim 16 is allowable over the proposed combination of *Hayashi* and *Kofuji* for at least these reasons. Furthermore, dependent claims 17 – 22 are allowable for at least the reason that they depend from allowable independent claim 16.

#### ***Dependent Claims 17 - 18***

Applicants submit that dependent claims 17 – 18 are allowable as a matter of law for at least the reason that claims 17 – 18 contain all the features and elements of independent claim 16, which Applicants believe to be allowable. For at least this reason, Applicants request that the rejection of claims 17 – 18 be withdrawn.

Furthermore, with respect to claim 17, the Office Action alleges that the "this controllable bias would inherently adapt the charged particle controller to control the

energy of charged particles being impacted on the substrate, determining the acceleration or reflection of charged particles form [sic] the additional structure.” (Office Action, pg. 6).

Similarly, as to claim 18, the Office Action recites that “this insulating member would inherently prevent charged particles in the in the plasma from reaching the substrate unless the charged particles pass through the charged particle controller means.” (Office Action, pg. 10).

Applicants respectfully traverse these findings of inherency. Specifically, Applicants submit that the Office Action has not provided a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art. In fact, Applicants submit that the Office Action is apparently using an inherency argument as a license to completely disregard the functional limitations in Applicants’ claims.

As recited in MPEP 2112 §IV, the fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993).

**V. Claims 19 – 22 and 26 are Patentable Over *Hayashi* in View of *Kofuji* in View of *Lee***

The Office Action indicates that claims 19 – 22 and 26 are rejected under 35 U.S. C. 103(a) as being allegedly unpatentable over *Hayashi* in view of *Kofuji*” as applied to claim 16 and further in view of *Lee*. Applicants submit that dependent claims 19 – 22 and 26 are allowable as a matter of law for at least the reason that claims 19 – 22 and 26

contain all the features and elements of independent claim 16, which Applicants believe to be allowable. For at least this reason, Applicants request that the rejection of claims 19 – 22 and 26 be withdrawn.

Furthermore, with respect to claims 20 – 22 and 26, the Office Action alleges that the “the pulse waveform would inherently be capable of working in concert with the pulse waveform connected to the substrate holder to direct enough ions of one charge towards the substrate to neutralize an existing charge on the substrate, without damaging the substrate.” (Office Action, pg. 11).

Applicants respectfully traverse the finding of inherency. Specifically, Applicants submit that the Office Action has not provided a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art. In fact, Applicants submit that the Office Action is apparently using an inherency argument as a license to completely disregard the functional limitations in Applicants’ claims.

As recited in MPEP 2112 §IV, the fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993).

## **VI. Prior Art Made of Record**

The remaining prior art made of record has been considered, but is not believed to affect the patentability of the presently pending claims.

### CONCLUSION

The Applicants respectfully submit that all claims are now in condition for allowance, and request that the Examiner pass this case to issuance. If, in the opinion of the Examiner, a telephonic conference would expedite the examination of this matter, the Examiner is invited to call the undersigned attorney at (770) 933-9500.

No fee is believed to be due in connection with this response. If, however, any fee is deemed to be payable, you are hereby authorized to charge any such fee to Deposit Account No. 20-0778.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Scott A. Horstemeyer", written over a horizontal line.

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